Memoirs of the Osaka Institute
of Technology, Series A
Vol. 46, No. 2 (2001) pp. 1～13

The Full-Wave Analysis on Nonlinear Magnetostatic Waves Devices by Finite Difference Time Domain Method

by

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(Manuscript received September 28, 2001)

Abstract

In this report, two types of application of the magnetostatic waves (MSWs) to the microwave devices have been investigated. The analysis is carried out by combining the equation of the magnetic dipole moment and Maxwell equation under the finite difference time domain (FDTD) method. First, the microwave signal amplification utilizing the MSW is analyzed. The improvement in the gain characteristics are examined by changing the position of the exciting and receiving antennas by taking the advantages of the FDTD method. The gain enhancement is about 3dB for the carrier frequency of 6GHz. The realization of the loss less waveguide made of an imperfect magnetic material with compensating the propagation loss by the parametric amplification is evaluated. Second, a new type of microwave signal mixer utilizing the MSW is proposed. As differences of the mixer operation from the conventional one, the MSW mixer described in this paper has no restriction to the operation frequency as far as the output signal can be tuned by the bias magnetic fields.